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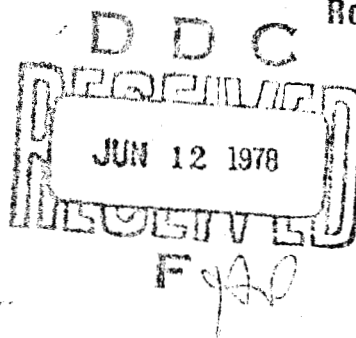
TECHNICAL REPORT

NATICK/TH/78/025

**A PROPOSED CONCEPT OF A MODERN
FOOD SERVICE SYSTEM FOR ARMY
COMBAT FORCES IN THE 1990'S**

by

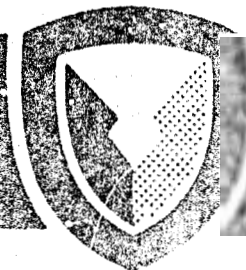
Robert J. Byrne



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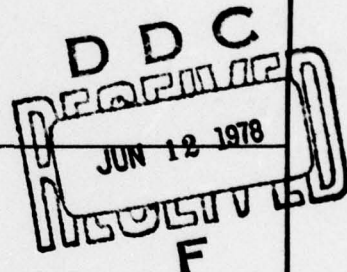
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SUMMARY

This analysis and report has been prepared to provide an outline or overview of a proposed new system of combat feeding for the Army of the 1990's and its projected influence on food service personnel and overall costs as compared to today's conventional system. The two major objectives used in defining the new system of food service are to improve responsiveness of food service (i.e., more frequent high quality hot meals, etc.) in the mobile environment of the 1990's and to increase efficiency. The projected achievement of both of these objectives has led toward a new system which maximizes the use of a new developing food technology in preprepared shelf-stable foods. The use of these new high quality preprepared foods will meet the responsiveness needs of the 1990 Army and also meet the need to increase efficiency by minimizing food service labor requirements. Logically, meals and/or foods which are shelf-stable at ambient conditions and merely need reheating during a lull in battle can go anywhere with the combat troops and can fit into any expected combat contingency. These same type of foods also provide the opportunity to significantly reduce food service labor.

In addition to the new developments in food and also equipment and packaging, which are necessary before the recommended new system could be deployed, there are other important considerations. A new total system has been proposed which will impact upon every aspect of providing food service to combat Army troops in the 1990 time frame. For example, the proposed system recommendations include a recommendation for creating a new Food Service Organization and Management Structure similar to the British Army Catering Corps. In addition, existing training doctrine, TO&E's, etc., will have to undergo major revisions before any new systems testing and deployment is considered.

The development, testing, and final deployment of a totally new system of food service as recommended herein will not be an easy task. Many different subtasks will have to be identified, initiated, and completed and many different organizations involved in all aspects of the overall system development.

The initiation of a major new systems development has to be based upon significant incentives such as improved system performance. This analysis and report was intended to provide these incentives. The new system recommended herein can provide a major improvement in food service systems performance by offering more frequent, high quality hot meals to troops engaged on the highly mobile battlefield of the

1990's. This system also has the potential to improve food service efficiency and increase total force combat effectiveness by freeing approximately fifty thousand troops from food service duties to combat duty assignments within a total combat force of one million. Because of these significant advantages, it is recommended that system development be initiated at an early date. It is also recommended and considered essential that the development program and all related actions be created and carried out as a total systems development program and not broken down into its various components parts for independent development, testing, and deployment. In relation to this recommendation, it is considered essential that a System Development Manager and team be established at NARADCOM to manage and direct this program and system through to final deployment.

PREFACE

This report covers the definition of a new system concept of food service for feeding Army troops under combat conditions and its comparison with current systems. The major objective of this effort was to define a system which could be responsive to the highly mobile Army battlefield of the 1990's and to improve efficiency. The proposed system described herein would meet these objectives by using high quality convenience foods which are shelf-stable and require no refrigeration. These foods could go anywhere with combat troops and meet all combat contingencies. They also provide the opportunity to significantly reduce food service labor requirements and relieve food service personnel spaces for direct assignment to combat units. In addition to the specific system component and hardware recommendations, a major recommendation is offered to establish a new organization and management structure for food services in the Army of the future. This organization and structure which would be a Food Service Corps similar to the British Army Catering Corps is considered necessary for improved responsiveness on the battlefield and effective management of the transition from combat to garrison feeding conditions.

This analysis and systems definition is one of several reports which will be issued to define and provide a cost benefit analysis of a new system of combat feeding for the Army of 1990 under Joint Service Requirement JSR AM 3-1 of the DOD Food RDT&E Program, Project No. 1L162724AH99A. The initial phase of this project was completed by the issuance of Technical Report NATICK/TR-77/003, "A Cost and Systems Effectiveness Analysis of Consolidated Field Feeding for Army AIM Divisions."

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A PROPOSED CONCEPT OF A MODERN FOOD SERVICE SYSTEM FOR ARMY COMBAT FORCES IN THE 1990's

GENERAL BACKGROUND AND DISCUSSION

The method of feeding troops in combat in the future (1990's) will be considerably different than the method used today which has experienced only minor changes since World War II. The needs which will dictate these differences will be the need to significantly reduce the required number of food service support personnel to improve system efficiency and the need for compatibility with the small, highly mobile tactical units on the 1990 battlefield. The means to fulfill these needs will be a new system of food service which will use food products which are high quality, preprepared and ready for heating and consumption by the troops when combat conditions permit.

The Army is interested in reducing support personnel to improve systems efficiency in all areas of combat support. This interest has been generated by the realization that personnel and personnel related programs encompass more than fifty to sixty percent of the Army's budget in any fiscal year thereby forcing severe limitations on the procurement of high technology weapons and the funding of new research and development programs. As a result of this interest, a modified system of feeding troops in combat was developed and successfully tested in FY 76 and is still under evaluation in connection with the Army's Division Restructuring Test. This modified system provides a "Battalion Level Kitchen" in lieu of company level kitchens to battalions which by their mission require co-location of their companies on the battlefield. This system also provides for larger than company size "Area Kitchens" in the division rear areas where division support troops are concentrated, and company kitchens for the smaller units dispersed on the battlefield or in the division support areas. The operation of the large Battalion and Area Kitchens involves food preparation and serving the hot food at the kitchen site or packaging the hot food in insulated containers and delivery of the hot food to smaller company size units dispersed at other scattered locations. The Battalion and Area Kitchen food preparation systems have one food service team preparing food for 800 to 1,000 troops rather than four or five separate teams each preparing food for only 200 troops.

Because of the higher production level this new system increases worker productivity by approximately 100% over the current company level feeding system. In actual field tests it has been verified that a battalion can be fed successfully by a single team of only 27 cooks and kitchen police^{1,2,3} rather than the four or five teams totaling 52 personnel which are required to feed a battalion when each company has its own food service operation. The successful testing of this modified system has validated that increasing the kitchen production scale factor (number of meals to be prepared) can be used to significantly reduce food service personnel. Increasing the food preparation scale factor as was done in this modified system, however, has severe limitations in that the delivery of hot food to dispersed units becomes a serious problem. For example, increasing the scale factor from a battalion level to a higher level is not practical because of the significant loss in quality and temperature of food that has to be delivered to the more widely dispersed units.

Since increased efficiencies can be achieved with consolidation of food preparation at higher than battalion level and since the limitations of the hot food delivery subsystem prevent practical consideration of these higher levels of consolidation, it is desirable and necessary to consider new forms of preservation and delivery after food is prepared. Progress in the preservation and quality of fully prepared food has been dramatic in the past decade. Fully prepared frozen and freeze dehydrated foods have been introduced and have wide acceptance in the market place. Also a new technology in high quality, thermally processed shelf-stable foods (half-steam table tray package products) is now being introduced into the market place. These new high quality foods have the potential in appropriate combinations to solve the problems of

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Baritz, S., Bustead, R., Bonczyk, T., Davis, M., Kirejczyk, H., Meiselman, H., Silverman, G., Smith, R., Stefaniw, I., Symington, L., "The Camp Edwards Experiment in Battalion Level Consolidated Field Feeding," 76-45-ORSA, US Army Natick R&D Command, Natick, MA, December 1975, (AD A024 070)

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Baritz, S., Bustead, R., Kirejczyk, H., Kulinski, M., Meiselman, H., Silverman, G., Smith, R., Stefaniw, I., Symington, L., "The Camp Pendleton Experiment in Battalion Level Field Feeding," 7T-4-ORSA, US Army Natick R&D Command, Natick, MA, July 1976, (AD A028 346)

³Kirejczyk, H., Baritz, S., Byrne, R., Kulinski, M., Smith, R., Stefaniw, I., "A Cost and Systems Effectiveness Analysis of Consolidated Field Feeding for Army AIM Divisions," NATICK/TR-77/003, US Army Natick R&D Command, Natick, MA, October 1976, (AD A035 410)

low quality associated with the preprepared foods of the past such as canned foods. Because of the existing and future potential of obtaining high quality fully prepared and preserved foods it is both feasible and logical to consider future combat feeding systems with consolidation of food preparation at the highest conceivable level. This level of consolidation would involve preparing, precooking and preserving food in CONUS for delivery to the combat zone for transshipment, reheating, and serving to the troops.

A system of preprepared foods that only need reheating before troop consumption could not only minimize food service labor in combat systems but could also insure feeding system compatibility with newly emerging Army doctrine which calls for small well-dispersed, highly mobile tactical units on the battlefields of the 1990's. In this instance the thrust towards higher levels of consolidation to save cooks through new preparation and preservation techniques solves the more important problem of feeding multiple small highly mobile combat units on future battlefields. With fully prepared and preserved foods, these small units can be furnished with a reheating capability to heat and eat their food when combat conditions permit. This type of feeding system would reap the benefits of increased efficiency by minimizing labor and would give maximum flexibility and mobility to the tactical units on the battlefields of the 1990's.

COMBAT-GARRISON SYSTEM INTERFACE

The new system of feeding troops in combat must be designed and deployed to interface effectively and efficiently with feeding troops when they are not in combat and are under garrison and/or peacetime conditions. In the past, assumptions have prevailed that only the equipment, menus, and types of food vary between combat and non-combat systems of feeding troops. As a result, the troop units (TO&E Units) that are subject to deployment and combat have had to maintain the same levels of food service personnel for both garrison and combat. This retention of the same staffing levels for both wartime and peacetime conditions is partially based upon historical considerations and the need to maintain unit readiness.

Historic considerations can be rejected as a reason to retain the same levels of food service workers in garrison as in combat. Prior to and immediately after World War II there was little difference between the number of troops who ate in unit messes when in the field or in garrison. Pay scales were so low and lifestyles so restrictive that there was little opportunity to eat elsewhere and when that opportunity occurred no incentive. As a result, the workforce requirement for field and garrison feeding was essentially similar. Today the increased levels of pay, the number of personnel on subsistence allowance, and the freedom of lifestyles has reduced garrison participation in unit messes to below 30% of unit roster strengths. As a result of these radical decreases in participation rates, the operational need for food service personnel in garrison systems has decreased proportionately. As military pay continues to rise and military lifestyles continue to become more liberal, it is expected that CONUS troop participation in garrison messes will decrease and the corresponding need for food service personnel in garrison systems will also decrease over the next ten to twenty years.

The need for maintaining unit readiness in peacetime is a critical military requirement. The Department of Defense and the Military departments can be considered a National Insurance Policy. When needed they protect the nation and the national interests. When not needed they must be continuously ready to provide this protection. Therefore, the staffing levels of units, including food service workers, that are subject to deployment and combat must usually be kept at the level required for deployment and combat. Under today's military environment, this policy does cause a serious dilemma. It requires the Army to recruit, train, and retain and pay more than twice the number of food service personnel required to feed the troops under peacetime garrison conditions. Assuming that peacetime conditions prevail many more years than wartime or combat conditions, the Army pays and continues to pay a stiff annual price for readiness in the food service area.

Because of the readiness requirement, the personnel requirements for food service in the combat environment must dictate the staffing level of Army food service workers required in the garrison environment and the resulting price the Army must pay in peacetime to keep a good food service readiness posture. Therefore, new systems of combat feeding must reduce personnel requirements and the price of maintaining this readiness posture to a minimum. If new systems of combat food service could effectively operate with equal to or fewer food service personnel than required for the garrison peacetime situation no annual operating price need be paid for food service readiness. Because of this consideration, new concepts that reduce the total personnel requirements for feeding 100% of the troops in combat to or below the number of personnel required to feed only 30% of the troops in garrison have been emphasized in concept design.

It is expected that new concepts for feeding troops under actual combat conditions and/or in the overseas theater can reduce the required number of food service personnel to or below the number required to meet CONUS garrison headcounts requirements. Therefore, it is possible that these new concepts could cause a shortage of food service personnel in garrison rather than a significant surplus as exists today. Since it makes little sense to employ more Army food service types than are needed for combat, garrison personnel shortages, if any, should be made up with civilian and/or contractor labor as required to meet these garrison needs.

Most of current Army planning for the future calls for 60 to 180 days war and/or combat operations. A system of food service which can operate in this environment must be combat support oriented. With such short and intense periods of combat, the food service system must meet its mission of providing frequent hot meals to highly mobile tactical units by using high quality preprepared and preserved foods. Because of the short duration of the conflict it is not expected that a food service system used during the conflict phase will emphasize or even consider perishable foods and conventional food preparation as are employed extensively in today's system of combat food service. As a result, the required number of personnel to operate the combat system of food service will be minimized. Therefore, when the combat phase ends and the troops have to hold the battle lines while negotiations take place, a transition from the combat system of food service to a base development garrison-type food service will be necessary.

The combat system of food service will be designed to provide the building blocks of the transitional and garrison systems of food service. The food service personnel, foods and equipment used in the combat system will all be used in the transitional system and garrison system. Therefore, the numbers of food service personnel and

their training levels required for combat feeding will be established at levels consistent with requirements of all three systems of food service (combat, transitional, and garrison). For example, when combat ceases, the small food service teams assigned to small combat units will be consolidated into area kitchen teams so that larger numbers of customers can be fed the expanded menus served during the transitional and the garrison phases of food service without an increase in number of trained food service personnel. If supplementary untrained labor such as KP labor is needed in the transitional or garrison phase, it can be added from other available military personnel and/or the available civilian workforce. Similarly, the food and equipment used during the combat phase will also be used in the other two phases. Supplementary food and equipment items including shelters will be added as conditions permit until regular garrison feeding is achieved.

In summary, a new system of combat food service is envisaged as employing high quality, preprepared, preserved foods processed in CONUS and shipped to the overseas theater of operations. These new foods will be designed to meet garrison food service acceptance standards and can be used in combat systems, transition systems, and garrison systems of food service. This new combat system will reduce the required number of trained food service workers for combat food service operations to or below those required to operate the peacetime garrison system in CONUS. This will significantly reduce Army peacetime costs by eliminating the need to recruit, train, and maintain a training base of food service personnel required by garrison headcounts. Augmentation of trained Army food service personnel by untrained military and/or civilian KP's in periods of transition from combat to garrison conditions is feasible and possible and will be considered during concept definition and design. For example, when a cease-fire occurs and a transition of the rudimentary combat food service to a base development or garrison-type system begins additional manpower might be needed to introduce improvements. This additional labor can be assigned to the food service system from combat units as KP's as is now done within the existing system. Also, as usually occurs, the employment of local civilian personnel can be used to supplement existing manpower.

COMBAT FEEDING SCENARIOS

In planning a new system of feeding troops in combat for use in the 1990's, it is essential to consider the battlefield of the 1990's. Combat of the future can range from counterinsurgency combat, as experienced in Vietnam, to all out nuclear warfare amongst major powers and all other varieties and combinations of these extremes. Also, combat can occur anywhere in the world under any and all climatic conditions. Because of the wide range of possible combat scenarios and climatic conditions, the new system that is designed and deployed should be able to operate effectively and efficiently under all conditions.

Historically, feeding systems are usually adaptable to a wide range of operational conditions. The combat system of food service that is now deployed in the Army was designed prior to World War II. This system has been used effectively in all the variations of combat experienced during World War II, Korea, Vietnam, etc. The system design factors which have provided this system its adaptability and longevity have been its simplicity and ruggedness of design, its modular design to address preparation of food for any number of customers, and its capability to heat and cook most food products and types (i.e., C-rations, B-rations, and A-rations). These same factors which have provided maximum adaptability and success in the past must be considered in the design of new systems.

Using the same important factors of system adaptability and generally considering all highly probable scenarios and climatic conditions, it is possible to address specific system concepts. However, because of time constraints all possible scenarios and climatic conditions cannot be addressed in specific details at this time. The approach will be to address one of the major Army scenarios and to design adaptable system concepts for consideration. From these systems and subsystems, concepts the best concept(s) will be selected for further development. During this future research and development effort, specific efforts will address the variations required in operating characteristics that might be required by other potential scenarios and battlefields.

In this system definition and design effort, it has been decided to use either a TRADOC standard or approved scenario. These engagements will involve three broad levels of field activities: combat, combat support, and the cease-fire and negotiation phase. Each of these three field activities are dynamic and will differ in scope, breadth, and area as the conflict engagement progresses in time. For example, in the initial stages the intense combat phase could engage all activities and all areas including submarine warfare in the Atlantic all the way to the eastern seaboard. Likewise, the final cease-fire and negotiation phase will involve all activities and all areas. What is important in the feeding system definition and design is to define the scope of the activities involved in each of these three broad phases over a time period from the beginning of the conflict and intense combat through all phases until the final cease-fire and negotiation phase and beyond. What is needed and what will be developed will be different snapshots in time of these three field activities depicting the troops, their locations, and their level of activity as the conflict progresses. With these data, final system definitions and design will proceed.

NEW FOOD SERVICE CONCEPTS FOR TROOPS IN ACTUAL COMBAT

As mentioned previously in this report, the new systems concept(s) will be developed by defining the system concept(s) for the troops in actual combat (intense combat phase) and then embellishing the concept(s) to provide the type of food service allowed by operating conditions in the rear areas. Since the range of activities will vary from the intense combat phase to the cease-fire and negotiation phase, the overall system concept will include subsystems which will vary from convenience food systems such as the meal ready to eat (MRE) to garrison type food services.

The troops engaged in actual combat can be divided into two broad groupings. One of these involves the troops who are assigned to combat vehicles and who would be expected to subsist with their vehicles in forward areas. The other would be the troops who are not assigned to combat vehicles or would not be expected to subsist with vehicles in forward areas. Examples of the first group are troops assigned to tanks, infantry, and cavalry fighting vehicles, and armored personnel carriers. Examples of the second group are infantry troops and others not assigned to vehicles, helicopter crews, and ambulance and truckdrivers.

While each of the two above groups is in combat they will be supported by two subsystems of food service. The first and most basic subsystem is the operational ration system. In any combat system of food service there will always be a need for an operational ration which can be carried by an individual in his pockets and consumed either cold or hot as combat conditions permit. In the system for the 1990's it is expected that this operational ration system will be based upon the meal ready to eat (MRE) system with expanded menu items and improved quality. This subsystem will require no food service personnel and no supporting equipment. The second subsystem planned for troops engaged in combat is a new convenience food system. In this system the food products will be preprepared and shelf-stable and will be procured in CONUS. Even though the food products can be eaten cold or hot it will normally be expected that these food products will be consumed hot. Therefore, some food service personnel and some equipment will be necessary. This convenience food subsystem will have at least two variations.

One variation of this convenience food system will address the troops who are assigned to and are expected to remain with and eat in or close to their vehicles. This variation, which is designated as the crew/team feeding subsystem, will involve either convenience shelf-stable foods packed in individual meal or crew portion packs and a heating device which can be plugged into the vehicle electrical power for heating the meal packs. This heating device should also be capable of heating operational rations. The heating and consumption of food in the crew feeding subsystem will be a responsibility of the crew. No food service personnel or special insulated containers for transshipment of hot food will be required in this system. Since the meal may be packaged with disposable dinnerware, no sanitation equipment or system may be required. Food resupply under this system will be tied to the vehicle fuel and/or ammunition resupply cycle. The resupply cycle will include a mix of operational rations and individual meal packs or crew portion packs depending upon the intensity and/or duration of combat operations. Usually it will be expected that these two types of food products will be issued in amounts which will be based upon the consumption of two meals per day of the individual or crew pack meals and one meal of the operational ration type.

The other variation of this convenience food system will address the troops who are in actual combat and who are not assigned to combat vehicles or are not expected to eat in forward areas at the vehicle site. This system will have some resemblance to the existing system in that food will be heated and served in close proximity to the troop combat area. The major difference with the new system will be that no food preparation will occur at the heating and/or consumption site. All food products distributed to the combat troops will be preprepared, shelf-stable, and ready for heating and consumption.

The preprepared (convenience) food products of this subsystem will be preserved and packaged in bulk form (tray pack), one-half steam table pan size, for food which is to be heated prior to consumption and in similar bulk pack for food that does not need reheating and is to be consumed in ambient or chilled status. The normal supply sequence will involve the assemblage of three types of packages at the supply depot level. These three packages will be assembled by breaking down the large containers received from CONUS into fifty-man packages that can be handled by one or two personnel without mechanical aids. A complete daily delivery of food service for fifty troops will include two packages of tray pack foods (fifty servings each), one package of fifty operational rations and one package of disposables and dinnerware.

The assembled food and other item modules (in fifty manpacks) will be transported to the Class I supply point adjacent to the combat area. These modules will be picked up by the food service personnel assigned to the combat troop units on a daily or biweekly schedule. Prior to meal time the food service personnel at the combat site will heat the food that needs heating, serve the hot and ambient food at the heating site to those troops who can visit this site, and issue the hot and ambient food in appropriate packages together with MRE's and disposables to personnel from the more remote troop units. These personnel will then transport the food and supporting items to the remote troop location for serving and disposal.

At least two methods of transport packages will be considered. The first will be a disposable fifty-man shipping container with appropriate lifting devices and the second a fifty-man insulated reusable container. Operational procedures with the disposable container will require the unit cooks to take the food products that need heating out of the container and place them in the heating device. After heating, the food to be consumed at the heating site together with disposable dinnerware will be issued to the troops there. The hot food and disposable dinnerware, which must be transshipped to remote sites, will then be placed back in the original disposable containers for this transshipment. Under this system, disposal of containers will occur at the consumption site. Operational procedures with the insulated containers will involve placing the food in these containers at the depot and then delivery to and reissue at the Class I supply point. In order to minimize food service labor and personnel, the insulated containers and the heating device will be designed so that the food that requires heating will remain in its insulated container during the heating cycle. Therefore, it is expected that once the food and other supporting items are placed in the containers at the supply depot level they will not be removed from these containers until they reach the point of troop consumption. During the normal heating cycle, the unit food service personnel will remove the container end(s) or side(s), butt the container to the heating device (container becomes part of the heating device) until the food is hot. The container will then be disconnected from the heating device and the food will be served at the heating site or the end(s) or side(s) of the container will be reassembled for transshipment of the hot and other foods and supporting items to the troops in more remote areas.

On the return cycle, these personnel will deliver empty containers back to the heating site when they return for additional food. The troop unit food service personnel will in turn deliver the empty containers back to the Class I supply point when they go to pick up

food resupply. These empty containers will then be trucked back to the supply depot on the return cycle for cleaning and reissue.

In summary, the total new system of field feeding will be based on a subsystem of feeding troops who are actually engaged in combat. This subsystem will include as components only food that is fully prepared and shelf-stable, a new standard disposable or reusable insulated container, heating devices which are compatible with and used in conjunction with these containers, and disposable tableware and dinnerware. The mode of operation of this subsystem will be similar to the operational concept depicted above with shelf-stable, self-heated and self-served individual packaged convenience meals for vehicle crews and bulk packs of convenience foods which are heated and served by unit food service personnel to infantry and other types of combat troops. Both systems will be supplemented with expanded variety and improved quality operational rations. With this type of food service the numbers of food service personnel will be quite limited. For example, if the defined food heating site for troops not assigned to vehicles is determined to be at the Company level it is expected that the number of food service personnel assigned to each Company will be limited to two or at the most three food service personnel. These food service personnel will be responsible for operating the entire subsystem without support from other troops. This combat system will be designed to feed a maximum of two hot meals daily to troops in the combat area. The range and intensity of combat conditions will dictate how many hot meals are served in actual operations.

NEW FOOD SERVICE CONCEPTS FOR SUPPORT TROOPS IN REAR AREAS

This combat system of food service will be embellished with additional food items and equipment to provide quality and morale building food service to troops who are engaged in support activities. In the design of this subsystem all the support troops will be assumed to be working hard and long hours in secure areas where food service operations can be expanded to provide three quality hot meals per day with salads and other food products which cannot be offered and are not included in the combat system of food service. The number of hot meals served per day in these rear support areas will be dictated by the variable operational conditions which prevail.

The most important design constraints to consider in designing this subsystem will be to minimize the number of food service personnel by using maximum amounts of good quality convenience foods and to minimize the logistics burden by using minimum volume dehydrated and compressed food items and food components. Since current military planning envisages intense submarine warfare in the Atlantic if a conflict starts in Europe it is expected that shipping space will be at a premium. This will be particularly true in the early phase of intense combat when supply of weapons and ammunition is critical. Therefore, the constraint of using maximum amounts of minimum volume foods and food components for food service systems to feed support troops and combat troops in reserve is an extremely important system design consideration.

This subsystem will use all of the components of the combat food service subsystems. The shelf-stable food products, heating equipment and containers will be used to provide food service to the support troops. In this subsystem, however, there will be additional food items and equipment to expand the quality and variety of the food service to the customers.

Because of the need to keep food service personnel to a minimum this subsystem will be designed in an area consolidated kitchen mode. These are kitchens which will prepare and/or heat and serve and/or distribute hot food to approximately 1,000 troops. Two types of consumers will be supported by these area kitchens. Those consumers who are served food at the kitchen site and those consumers who consume the food prepared and/or heated and packaged in the area kitchen at their more remote sites.

The food service subsystem which provides food to the support troops at remote sites will be essentially similar to the combat food service system. The same preprepared shelf-stable bulk packs of food, heating devices and insulated containers will be used to provide at least two hot meals daily to these personnel. It will normally be expected, however, that there will be additional food products added to the menu over and above the combat menu. These additions will include, but may not be limited to salads, desserts, and bread and other bakery products. These additional items will be prepared and/or packaged at the kitchen in the same disposable and/or reusable insulated containers for transshipment with the hot food containers and disposable packs to the remote eating sites. As in the combat system of food service, the area kitchen personnel will not transport the food to the remote sites but will issue the containerized food modules to personnel from the remote site for their transshipment and serving. Even though the menu will be augmented for support personnel who cannot come to the kitchen site to eat, it is important to stress that the system used will be the same as that used to feed combat troops in remote sites. The best system for preparation and delivery of meals to remote sites is the system designed for troops in combat. Therefore, this is the system which should be used for those support troops who cannot come to the area kitchen site to eat. Two methods of heating the food will be used. For troops who cannot come to the kitchen to eat but are close enough so that a hot food delivery system can be used effectively, the food will be heated in the area kitchen and issued and distributed hot in insulated containers. Troops in very remote areas will be issued heating devices and will pick up unheated food and heat it at the troop location site.

The food service system which services the support troops who can eat at the kitchen site will have some similarity to the combat system in that it will use the foods and equipment from the combat system but will use additional foods and equipment also. The objective of this system will be to provide continuous hot food service to troops who can come to the kitchen site. This continuous service will emphasize the serving of three hot meals a day but will also provide hot meals at other times as required by customers by keeping some food items hot and available throughout the day. As a minimum, the individual tray of the crew feeding system should be available to customers at any time. The different foods that will be added will be shelf-stable, dehydrated compressed food and components, and some limited perishables such as salads, milk and bakery products.

The additional equipment which will be added are area kitchen shelters, cooking and heating equipment and utensils, serving line equipment, work tables, racks and sanitation equipment and capabilities. In addition, as the conflict progresses in time the area kitchens most remote from the Forward Edge of the Battle Area (FEBA) will be expected to add refrigeration, dining area shelters, other electrical support equipment, etc. It is expected that the area kitchen wherever it is located will have limited electrical

generation capabilities. This capability will be used to operate lights, a few small electrically operated kitchen tools and the pumping of hot water. Other than these few exceptions, the area kitchen is planned to be a fuel-fired kitchen. In addition to the food and equipment embellishments, it is expected that five compartment plastic tray service can be offered to support troops who eat at the kitchen site as the kitchen area becomes more secure and as sanitation capability is established.

The numbers of food service personnel required to operate the area kitchens will differ very little from the total numbers required for the company level combat system. For example, if three personnel are needed to pick up, heat, and serve food to a company of 200 men and an area kitchen is supposed to accomplish the same or similar job for 1,000 men, then the area kitchen concept will be designed to accomplish this task with the same staffing level of fifteen food service personnel. This level of fifteen trained full-time food service personnel is consistent with the number of cooks used successfully in the new XM-75 consolidated system of feeding tested in 1976 (see references 1, 2, and 3). Therefore, it is expected that new food and equipment technology can be used to design a new improved area kitchen concept which can be operated with fifteen food service personnel and feed 1,000 troops. If any personnel augmentation is needed, it will be needed in the sanitation function which can be accomplished by assigned duty soldier (KP's) and/or local populations.

This new concept of area kitchens will require a substantial change in organizational structure and management for the Army. Central management and control of all food service resources including food service personnel is essential to total system success. In order to achieve this type of control and system adaptability, a food service battalion or brigade will be staffed with Officer and enlisted staff who are trained and skilled in food service management and operations. These personnel will be assigned in food service teams to the supply depots, Class I supply points, combat companies, area kitchens, etc., to manage and operate the total food service system. The organization of the food service battalion or brigade will be established to provide maximum flexibility in the assignments of food service teams to where they are needed to operate the system. When a team of two or three food service personnel is assigned to a company in combat, this team will stay with the company throughout the conflict and will report to the Company Commander. This team, however, will have access to the food service battalion or brigade headquarters to enlist their aid in solving company food service problems. On the other hand, the teams assigned to set up and manage the area kitchens as described in this Section will report directly to the food service battalion or brigade headquarters and will operate under headquarters direction.

NEW FEEDING SYSTEM CONCEPTS TO FEED TROOPS
DURING THE CEASE-FIRE NEGOTIATION PHASE

At the end of, and after the combat phase, troops must still eat. When the fighting ceases the rear area system of feeding covered in this report will be extended up to and including the Forward Edge of the Battle Area (FEBA). The mode of food heating operations at the company level should cease and area or battalion kitchens set up and operated. Food service personnel previously working at the company level during combat will now be consolidated and work at the battalion level. The battalion kitchen system will operate as standard area kitchens with the same type of food, equipment, and mode of operations. There will still be two types of customers, those who can come to the kitchen to eat and those who cannot. Kitchen preparation and serving at the kitchen site, and kitchen preparation packaging and issuing to troops who must eat in remote areas will be as specified in the rear feeding system. As the non-fighting or non-combat phase progresses in time, it is expected that menu and systems embellishment will expand. For example, fresh foods from local sources will be introduced, dining area tents and/or shelters will be set up and used, electricity and refrigeration capabilities will grow and be used, etc.

There are two operating constraints that will not change, however, as time progresses in this phase. These are: the limited number of Army food service personnel; and the requirement to use (continuous rotation) all of the food items used during the combat phases. These two constraints are compatible and/or related since the use of low labor food items from the combat phases will compensate somewhat for the lack of Army food service personnel.

Following a cease-fire food service operations will approach the standards of garrison food service by progressing from combat food service to a more stable base development system with multiple food choices, etc., and the need for additional personnel will expand. It is expected that there will not be enough Army food service personnel to offer this type of expanded food service to the high customer counts (80% of the roster strength or better) that will initially be experienced in the overseas theater. The overall system of food service for this phase should be designed and managed to obtain and provide the additional manpower requirements from one or more of three sources. These sources are: duty soldiers drawn from participating units (KP's); the local population; and, civilian contract labor from local areas or CONUS.

If this phase lasts as long as the occupation phases have in Germany and Korea (years), the need for labor supplements could be expected to decrease as troop headcounts decrease. In the initial time period after the shooting stops 80% to 90% headcounts can be expected at area kitchens, however, as the occupation period increases in time the headcounts can be expected to drop to levels of 60% or less. As the months roll by and dependents arrive, these headcounts will eventually drop to 30% or less of the unit roster strengths as they currently are in overseas garrison operations and the need for augmentation of Army food service personnel will correspondingly decrease.

In summary, a base development garrison level quality system is proposed for the cease-fire and negotiation phase. When the cease-fire occurs the entire overseas theater will be converted to the same system of area kitchens being used to feed the support troops while combat was still going on. As time progresses, these area kitchen operations will gradually expand operations until full garrison status is achieved. Augmentation of Army food service personnel will be accomplished as required throughout this entire phase of operations.

FOOD ITEMS, MENUS, AND MENU CYCLES

In the design of food service systems and subsystems there are many important components to consider, some of these are equipment, facilities, numbers and types of food service personnel, operating hours, etc. None of these components, however, is as important in the design phase as the menu and related considerations. It is the preference and quality of the food items, the frequency of serving and temperature of the food as consumed that ultimately determines the level of service to the customer. This level of service to the customer in turn is what determines the effectiveness of the system of food service.

The level of service to the troops in the field environment as represented by the menu and the quality of the food should be equal to or as close to as possible to the level of service troops could expect in a garrison system. Since the field environment has many more constraints than a garrison environment, it is expected that the level of service to the troops in the field will not be as high as it is in a true CONUS garrison situation. It is possible, however, to strive to meet this level of service and to come as close to it as the expected constraints of field operations permit.

The quality of food in a system of food service has many considerations. The most important overall consideration, however, is the troop or customer perception of quality. The definition of quality as related to customer perception includes at least four dimensions. These are: customer preferences for the food items, the flavor or taste of the items, the frequency of serving the items, and the temperature of the items as consumed. In the design of this system, it is assumed that existing food technologies and those that can be developed and perfected to deploy this new system of food service will insure that the required levels of food quality as related to customer taste will be achieved. It is also assumed that equipment development such as heating devices and insulated containers will insure that the food items get to the consumers at the proper temperatures. The other two dimensions of troop preference and frequency of serving must, and will be addressed, in initial system design and designed into the system. Considerable quantified data on troop preferences has been collected by NARADCOM from the Army and DOD in the form of hedonic values on all the possible food items that are or could be served in food service systems. Also, NARADCOM has recently developed and has operating a computerized system which develops an optimum list of food items and their frequency of serving. This list maximizes troop preference subject to cost and nutritional

constraints. Since the input data on individual food item preference, cost and nutrition are considered valid and the best available, then the food list solutions generated by this computer model must be equally valid and the best consumer food lists possible subject to cost limitations.

This new computerized menu planning system will be used in the design of this food service system to generate optimized lists of food and their frequency of serving for each of the three subsystems being considered. The approach will involve the development of a 14-day cycle of food items and their frequency of serving for the combat phase, a 28-day cycle for the support phase, and a 42-day cycle for the cease-fire and negotiation phase.

The preference optimized food list for these three cycles will be developed by the computer model using the current garrison basic daily food allowance cost limitations. The list of food items for the 14-day cycle will be analyzed to determine if existing and future (prior to 1990) technology can insure that the listed food items can meet garrison quality standards when prepared and manufactured as shelf-stable convenience food items in CONUS. It is expected that many trade-off decisions will have to be made as to which food form and/or recipes should be included on the final adjusted listing. For example, roast beef will appear on the computerized list, but will probably appear on the final list as precooked and pre-sliced roast beef in gravy. The final list for the 14-day cycle will then be used to modify the computer generated list for the 28 and 42-day cycles. In each case, the larger cycles will contain the same foods included in the lower cycle lists. For example, the precooked, shelf-stable foods in the combat 14-day cycle will be included in both the 28 and 42-day cycles. Also, all of the food listed in the final 28-day combat support cycle will be included on the 42-day cycle for the cease-fire garrison type system. The list for the 28-day cycle will be developed in the same manner as the list for the 14-day cycle. In this instance, however, the computer generated list will be analyzed to determine what existing and future applied technology can offer with regard to food forms, other than precooked shelf-stable ready to eat forms, such as dehydrated and freeze dehydrated menu items and menu item components. The final 28-day cycle list will contain the convenience shelf-stable foods from the 14-day combat cycle, dehydrated and compressed food and a minimum of perishable foods. The final list of food items for the 42-day cycle will be generated using the same approach except that the numbers of fresh and perishable products will increase. This 42-day cycle list will contain all the specific foods included on the 14 and 28-day cycles plus an increased number and variety of fresh frozen and perishable foods.

In summary, three lists of food items together with the frequency of serving will be developed. The first list will include the food that will be served to troops while they are in actual combat and will include a 14-day cycle of foods that are fully preprepared and shelf-stable. The second list will include the foods that will be fed to support and rear area troops while the conflict is still in progress. This list will include all the shelf-stable preprepared foods of the combat food list, dehydrated and compressed foods and a minimum of perishable food items. The third list will include the foods that will be served to all troops after the conflict stops and while they are in the overseas area. This list will include all of the specific foods included in the first and second lists as well as a variety of fresh, frozen and perishable products. These three lists will then be used as a basis for designing and subsystems and the total system of food service. It is important to emphasize that the BDFA cost constraint will be used in developing the original lists of food products for each subsystem to insure that the level of feeding as represented by the food items and frequency of serving is as close as possible to the established level of garrison feeding as covered by Federal Statutes. Even though trade-offs in food forms and recipes will be necessary because of constraints such as lack of refrigeration effort will be directed to keeping the lists of foods essentially compatible with the established garrison standards.

These lists of foods when finally completed will serve as the basic building block to establish the follow-on food and packaging R&D Program that will be required before the proposed system can be deployed. The details of current and projected development of each food group and/or item will be used to determine what food and packaging R&D effort are necessary to deploy the system. This information will then be used to develop appropriate cost estimates and project milestones.

FOOD SERVICE PERSONNEL

Throughout this report reference is made to increasing system efficiency by reducing the numbers of food service personnel through the introduction of convenience foods into the new concepts of food service. In addition to reducing the numbers of food service personnel, this dependence upon convenience foods for the combat phase will also significantly reduce the food preparation and cooking skill levels which are necessary to operate this particular phase of the food service system. Therefore, the food service personnel engaged in heating and serving food to the combat troops will not need nor will they utilize these types of skills. However, a dynamic system of food service is proposed which will vary from convenience food operations in combat to complete garrison operations as a function of time and/or location within the combat zone and/or overseas theater. Because of the dynamics of having different types of food service operations within the total system and the restricted numbers of Army food service personnel, it is necessary that all food service personnel be trained and skilled in food preparation activities to the levels dictated by regular garrison food service operations. In addition, food service personnel should be trained and skilled in managing, operating, and maintaining all of the subsystems of food service described herein.

The overall trends in institutional feeding systems have been progressing over the years towards ever increasing use of convenience foods, therefore, it is reasonable to expect that the level of training and skills required in food preparation and cooking in military garrison feeding systems will decrease over the next ten years and into the 1990's. However, this reduction of training in these particular skills should not be interpreted to imply a reduction in the general training and skill levels of Army food service personnel. The total system of food service proposed in this report is a complex system with many parts and many operational variations. The successful deployment of this system is dependent upon having a highly skilled, trained, and motivated organization and force of Army food service personnel who can manage and operate this dynamic system of food service. The reduction of training emphasis in cooking and preparation skills can be and should be considered an opportunity to increase much needed and neglected training in food service management, personnel training and motivation techniques, equipment maintenance, record keeping, increased training with field equipment and foods, etc.

In summary, even though there probably will be a shift in the type of training and skills there is expected to be no reduction in the amount of training and/or skill level required. Just the opposite is expected. A highly motivated professional, well-managed food service organization and workforce is needed to provide good food service to all Army troops in all combat and garrison environments. The only way to build and keep such an organization is with increased training, skills, and motivation.

FOOD SERVICE ORGANIZATION

The new system of food service will require a new system of food service management and organization. The concept of operating small kitchens, which heat convenience foods at the small unit level (company level or smaller), while troop units are operating under combat conditions and area kitchens when units are in the rear support areas or when combat ceases, will require Division and/or Corps Central ownership and management of food service resources. Vertical ownership of these resources including food service personnel is necessary to allow efficient consolidation of these resources into area kitchens or break down into small unit kitchens as the combat situation and/or location of major troop units necessitates these changes. Operational plans which provide for smooth transition and reorganization from large to small and small to large kitchen teams will be established. These plans will be initiated by the Central Food Service Management Activity when predetermined operational conditions require their execution.

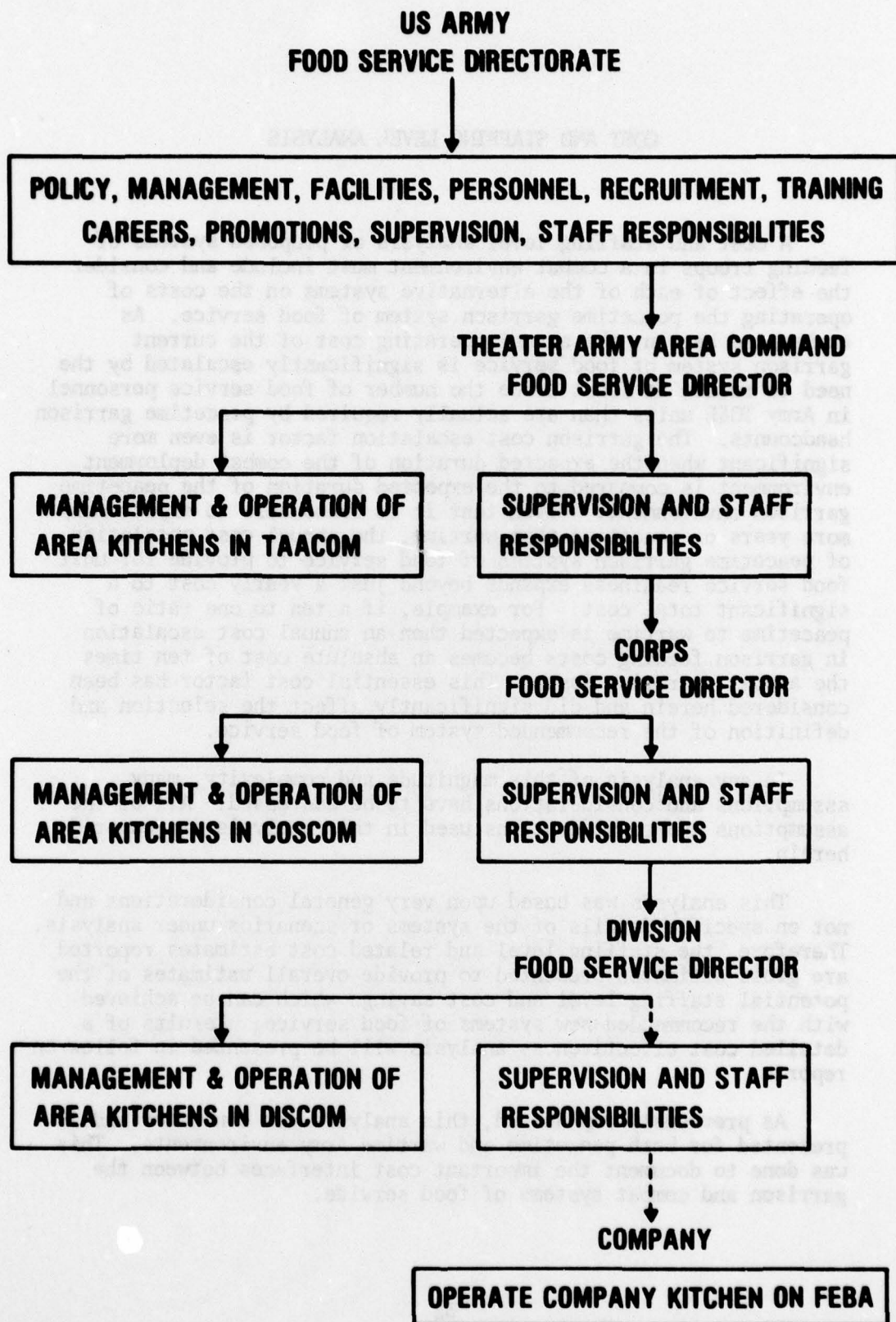
In its broadest sense an organization similar to the British Catering Corps is envisaged. This organization gives the British Army the best of both worlds since centralized management and efficiency are maintained while at the same time unit integrity is encouraged and protected. All food service personnel to the highest general officer level are part of the Army Catering Corps. When food service personnel are assigned to troop units they belong to the troop unit and report to the unit Commander. However, even though they are part of the unit they are still monitored and supervised by the Catering Corps for training, promotion, and reassignment purposes. As mentioned, this type organization gives the desired vertical management and control of food service resources which would improve food service efficiency and effectiveness and it still encourages and protects unit integrity. This type of organization also creates an organizational environment which serves to maintain a highly motivated, dedicated, well-trained, and integrated food service management and workforce system.

In the recommended centralized food service organization, a theater or Corps Food Service Command element will manage and control all food service resources including supplies from their point of entry into the theater of operations. This Corps Food Service Command will report through channels to the Corps Commander and will exercise

direct supervisory responsibilities over all food service activities (area kitchens) in the Corps Support Command Area (CosCom). This Command will also have staff supervision responsibilities and monitor and provide support to the Division Food Service Commands. These Division Food Service Commands will report to the Division Command group and will supervise and control all food service resources including supply resources within the Division. This Division Command will create and manage and operate area kitchens in the Division Support area in accordance with preestablished plans and operational doctrine. This Command will also control assignment of other food service resources, equipment, personnel, and supplies to smaller Divisional Units, such as Company Units who are located on the Forward Edge of the Battle Area (FEBA). These company level food service units will report directly to the Company Commanders and will operate the company kitchens which will reheat convenience foods. These units will also have direct access to centralized divisional management for appropriate support activities as required. An example of this proposed organization, which includes overall Army management and the Theater Army Area Command, is shown on the proposed organizational chart.

In its full operational mode the Theater or Corps Centralized Food Service activity will be responsible for all food service within the Theater or Corps. It will directly create, manage, and supervise the area kitchens in the CosCom and will provide staff supervision and/or support to the Centralized Division food service command. This Division Command will in turn create, manage, and supervise area kitchens in the Division Support Area (DISCOM) and will provide staff supervision and support to the Company level convenience food kitchens.

As conditions warrant, the Division management unit will add or subtract food service resources to or from company level combat units depending upon their mission within the battlefield. Company units whose mission is in the DISCOM area will not usually have integral food service resources and will subsist out of area kitchens. Company units on the FEBA will have an integral convenience food capability and will be assigned the necessary resources. When the final cease-fire phase of the conflict is reached, the Division Food Service Command will withdraw all Company level food service resources and create new battalion level kitchens to support the front line troops. At this point in time, the transition from combat systems of food service to garrison systems will begin and all food service resources will be under the direct supervision of the Division and Corps Food Service Command groups.



COST AND STAFFING LEVEL ANALYSIS

A cost and staffing level analysis of proposed systems of feeding troops in a combat environment must include and consider the effect of each of the alternative systems on the costs of operating the peacetime garrison system of food service. As emphasized herein, the annual operating cost of the current garrison system of food service is significantly escalated by the need to retain at least twice the number of food service personnel in Army TO&E units than are actually required by peacetime garrison headcounts. The garrison cost escalation factor is even more significant when the expected duration of the combat deployment environment is compared to the expected duration of the peacetime garrison environment. Given that it is reasonable to expect many more years of peacetime than wartime, the annual cost escalation of peacetime garrison systems of food service to provide for unit food service readiness expands beyond just a yearly cost to a significant total cost. For example, if a ten to one ratio of peacetime to wartime is expected then an annual cost escalation in garrison feeding costs becomes an absolute cost of ten times the annual operating costs. This essential cost factor has been considered herein and did significantly affect the selection and definition of the recommended system of food service.

In any analysis of this magnitude and complexity, many assumptions and considerations have to be addressed. All of the assumptions and considerations used in this analysis are covered herein.

This analysis was based upon very general considerations and not on specific details of the systems or scenarios under analysis. Therefore, the staffing level and related cost estimates reported are gross estimates presented to provide overall estimates of the potential staffing level and cost savings which can be achieved with the recommended new systems of food service. Results of a detailed cost effectiveness analysis will be presented in follow-on reports.

As previously emphasized, this analysis was conducted and is presented for both peacetime and wartime Army environments. This was done to document the important cost interfaces between the garrison and combat systems of food service.

This analysis is concerned with combat systems of food service; therefore, the cost and staffing level comparisons were limited to only combat (TO&E) troops. The number of combat troops used for the peacetime is based on an estimate of the number of combat troops in today's Army. The number of combat troops used for the wartime is an estimate of the total number of combat troops associated with the current European scenario. These two totals, peacetime and wartime, were assumed to be representative of the numbers of troops that will prevail in the 1990 timeframe when the new system of food service can be deployed.

The results of the analysis are sensitive to the surplus of Army food service personnel that exists in Army combat units when they are in garrison. This surplus as reported herein is based upon detailed headcount and food service staffing data from one division and related Army staffing guides (see reference 3). Because of the uncertainty of the proration of these data to all combat units conservative estimates of peacetime headcounts and related staffing needs were used to obtain the totals reported herein. Even with the above uncertainties it is apparent that there is a significant labor surplus in peacetime because of low garrison headcounts and that reduction of this surplus through the deployment of a new Combat Food Service System will provide substantial cost savings.

The cost of the average trained food service worker has been calculated and estimated at \$15,600 per year (FY 77 costs). The cost of KP's is estimated at \$11,900 per year (FY 77 costs). These costs are based upon current Army average grades in these assignments and standard costs including all benefits (see reference 3).

The new system of combat food service recommends extensive use of shelf-stable convenience foods which are preprepared in CONUS and only need heating at the consumption site. These foods have labor costs built into the package, therefore, foods costs should be higher for the new system than for a system which uses conventional foods. Detailed analysis of the cost of these new foods is continuing and will be included in future reports. Pending completion of this detailed analysis, a conservative estimate of twice the current cost of the Basic Daily Food Allowance has been allocated to the convenience foods used during the wartime period. Even though some use of these convenience foods is projected during peacetime (i.e., to ease ration rotation problems and reduce garrison labor costs) the cost analysis and cost impact of this use has not been completed and was not included in this analysis. This information will be included in the follow-on detailed cost analysis report. In this analysis, annual food costs are assumed to remain constant between systems

under a garrison environment. Under a wartime environment it was assumed that the ration consists of 60% A/B rations and 40% MCI rations with the company or consolidated/area feeding systems and 60% convenience foods and 40% MIC for the new system. The cost (FY 77) of each type ration used for cost estimation purposes was:

\$2.75 A/B ration

\$4.28 MCI ration

\$5.50 Convenience Food ration

Three systems of combat food service were compared in this cost analysis. These systems were:

- a. The conventional standard company level kitchen system.
- b. A consolidated system which includes food preparation within the Division at the battalion level for those companies which are co-located on the battlefield (see reference 3).
- c. A new system of combat food service which maximizes the use of convenience preprepared foods at company or lower level during combat and transitions to area kitchens and garrison operations when the combat phase ends. This new system is analyzed at two levels of staffing. One level assumes that two food service personnel will be required to feed a company in combat and the other assumes that three food service personnel will be required for this task.

Each of these systems were evaluated at two troop levels. The first level was the peacetime level which was established at the current TO&E strength figure of approximately 530,000 troops. The second level was the 1,100,000 Army TO&E troops planned for the TRADOC European scenario. Food Service labor and food costs were estimated for each of these systems at each of the two troop levels. Other costs such as equipment costs were expected to remain relatively constant amongst the systems and were not necessary to develop the required estimates.

The troop levels, estimated diner headcounts, and type of food preparation required dictated the labor requirements for each system. For example, since conventional company level food preparation activities would be required by the conventional system under wartime conditions standard Army TO&E staffing regulations were used to compute the labor requirements to feed all of the troops in wartime. This labor requirement for the conventional system was significantly reduced in the peacetime analysis because of reduced troops and headcount requirements. Also, since civilian KP's are used in peacetime

and these KP's are based upon actual diner headcounts this labor item would be the same for each system and does not show in the personnel and dollar savings compilation. The wartime labor requirements for the "Battalion Level" feeding system were significantly reduced because of the labor savings associated with a higher level food production operation. This labor savings was derived from actual field testing (see references 1 and 2). The labor savings in wartime allows a significant reduction in the peacetime labor surplus and a corresponding decrease in peacetime operating costs. The labor requirements for the recommended new system were further reduced because of the extensive use of preprepared shelf-stable foods. This additional labor reduction significantly decreases the labor surplus in peacetime when three food service personnel are required to feed a company. When only two food service personnel are required to feed a company, the peacetime labor surplus becomes a deficit which could be filled with civilian personnel.

Food costs for the conventional system were computed based upon the use of conventional foods in both peacetime and wartime. Conventional food costs were also used for the battalion level system. As previously mentioned, food costs for the new system were based upon double the conventional food costs during wartime because of the use of convenience type foods. Conventional food costs were used for the new system during peacetime.

The results of this analysis are shown on Table 1 and Table 2. Table 1 covers the personnel requirements for each of the three systems and the projected personnel savings for the consolidated and new systems. Table 2 covers the projected dollar savings for the consolidated and the new system.

The results of this analysis highlights the potential food service personnel and cost savings that could be realized by investing in the development of a new system of combat food service. Even though the savings in personnel are translated as resulting in cost savings, it is important to realize that this savings in personnel and dollars are related to savings within the food service system. If the Army takes advantage of these large personnel savings to increase combat forces and, therefore, effectiveness there will be no overall Army savings in personnel and costs but a substantial increase in combat effectiveness.

TABLE 1

PERSONNEL SAVINGS

NEW CONCEPTS OF COMBAT FEEDING - ARMY

SYSTEM	PEACETIME (Str 530,000) (Existing Army)				WARTIME (Str 1,100,000) (European Scenario)			
	STAFFING				REQUIREMENT			
	TOE COOKS AUTH	GARR. REQ	GARR. EXCESS		COOKS	K.P.	COOKS	K.P.
CONVENTIONAL (Company)	19,900	9,000	10,900		41,300	28,400	-	-
CONSOLIDATED (Battalion & Company)	16,200	9,000	7,200		33,900	23,200	7,400	5,200
New System - 3 Food Svc Pers (Company)	9,900	9,000	900		20,400	0	20,900	28,400
New System - 2 Food Svc Pers (Company)	6,600	9,000	(2,400)		13,700	0	27,600	28,400

TABLE 2

\$ SAVINGS (MILLIONS)

NEW CONCEPTS OF COMBAT FEEDING - ARMY

	PEACETIME			WARTIME		
	F.S. LABOR	FOOD	TOTAL	F.S. LABOR	K.P. LABOR	FOOD TOTAL
CONVENTIONAL (Company)	-	-	-	-	-	-
CONSOLIDATED (Battalion & Company)	58	-	58	115	62	- 177
NEW SYSTEM - 3 Food Svc Pers (Company)	156	-	156	326	338	(662) 2
NEW SYSTEM - 2 Food Svc Pers (Company)	170	-	170	431	338	(662) 107

As noted on the summary charts, the system which has the highest potential to save personnel spaces within the food service system thereby providing the best opportunity to increase combat effectiveness is the new system. For example, if the new system can operate at the company level with only three food service personnel approximately 50,000 food service personnel spaces can be saved in the wartime scenario and reassigned to increase the number of combat personnel. Therefore, the investment in developing this new system of food service for combat can increase combat effectiveness by adding the equivalent of almost three combat divisions to the total combat force without increasing total cost.

From a cost savings point of view this new system can also significantly reduce or eliminate the costs of the surplus TO&E food service personnel that exists during peacetime conditions by providing more labor efficient combat systems. It is interesting to note that the system that provides the most dollar savings in wartime is the consolidated system which uses conventional foods. If the worst case of continuous warfare or even one year of peacetime to two year wartime ratio were used, selection of this system would reap the most cost benefits. However, this worst case has to be rejected as a logical conclusion; therefore, the new system which has the potential to save just over a hundred million dollars per year within the food service system in wartime and one hundred and seventy million dollars in this system in peacetime would provide the most savings.

In summary, the advantages of pursuing the development and deployment of the new system seems obvious whether the objective is cost savings or increased combat effectiveness.